



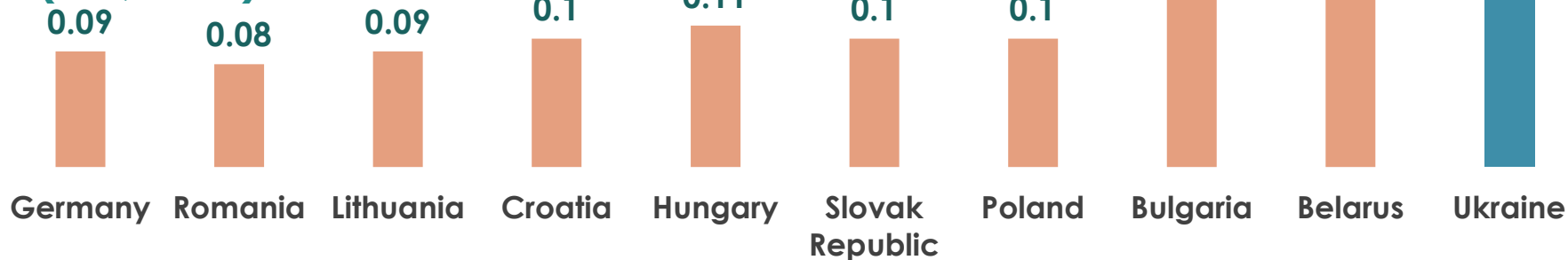
# Investment Opportunities of Renewable Energy in Ukraine

State Agency on Energy Efficiency  
and Energy Saving of Ukraine



# ENERGY EFFICIENCY AND RENEWABLE ENERGY SECTORAL POLICIES

## Energy intensity in European countries (IEA, 2016)



33%

32%

8%

17%

10%

### Households

- State and local programs of co-financing of energy efficiency
- Households stimulation on installation of wind and solar plants
- Energy labelling systems
- Full metering of energy consumption
- Stimulation of recipients of subsidies to save energy

### Industry

- Stimulation through energy tax
- Energy Performance Contracts

### Services, Public Entities and Agriculture

- Energy Performance Contracts
- The mechanism of energy management

### Transport and Non-energy use

- Stimulation of liquid biofuels production
- Extension of electric vehicles usage



# KEY PRIORITY: SUBSTITUTION OF NATURAL GAS

## Reduction of natural gas consumption

2014 - 2017\*

## New biomass heat generation facilities

2014 – 2017\*\*



$\Sigma$  2 GW

More than 460 mln EUR  
investments attracted

\*According to "Naftogaz Ukraine"  
(Excluding Crimea, Luhansk and Donetsk regions).

\*\*According to regional state administrations.



## National RENEWABLE ENERGY Action Plan till 2020

**11% of energy, produced from RES**  
In total energy consumption



## National ENERGY EFFICIENCY Action Plan till 2020

**9% of energy saving comparing**  
to the average final energy consumption in 2005-  
2009



## Energy Strategy of Ukraine till 2035

**25% of energy, produced from RES** in  
the structure of primary energy supply





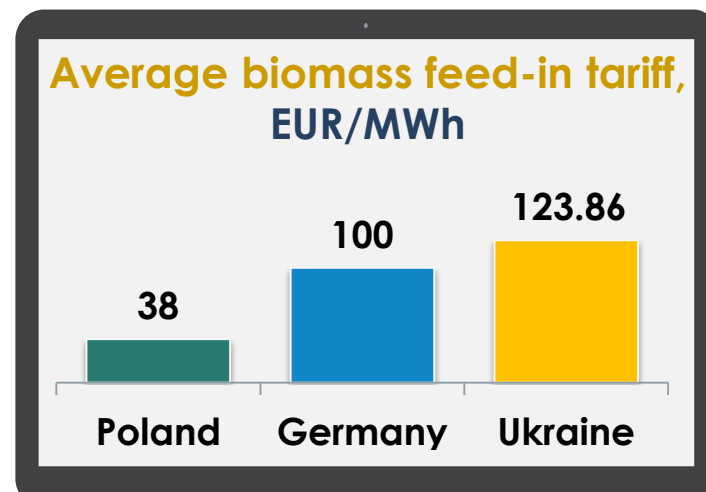
# LAW OF UKRAINE

## «ON FOSTERING RENEWABLE ENERGY DEVELOPMENT»

EUR/MWh

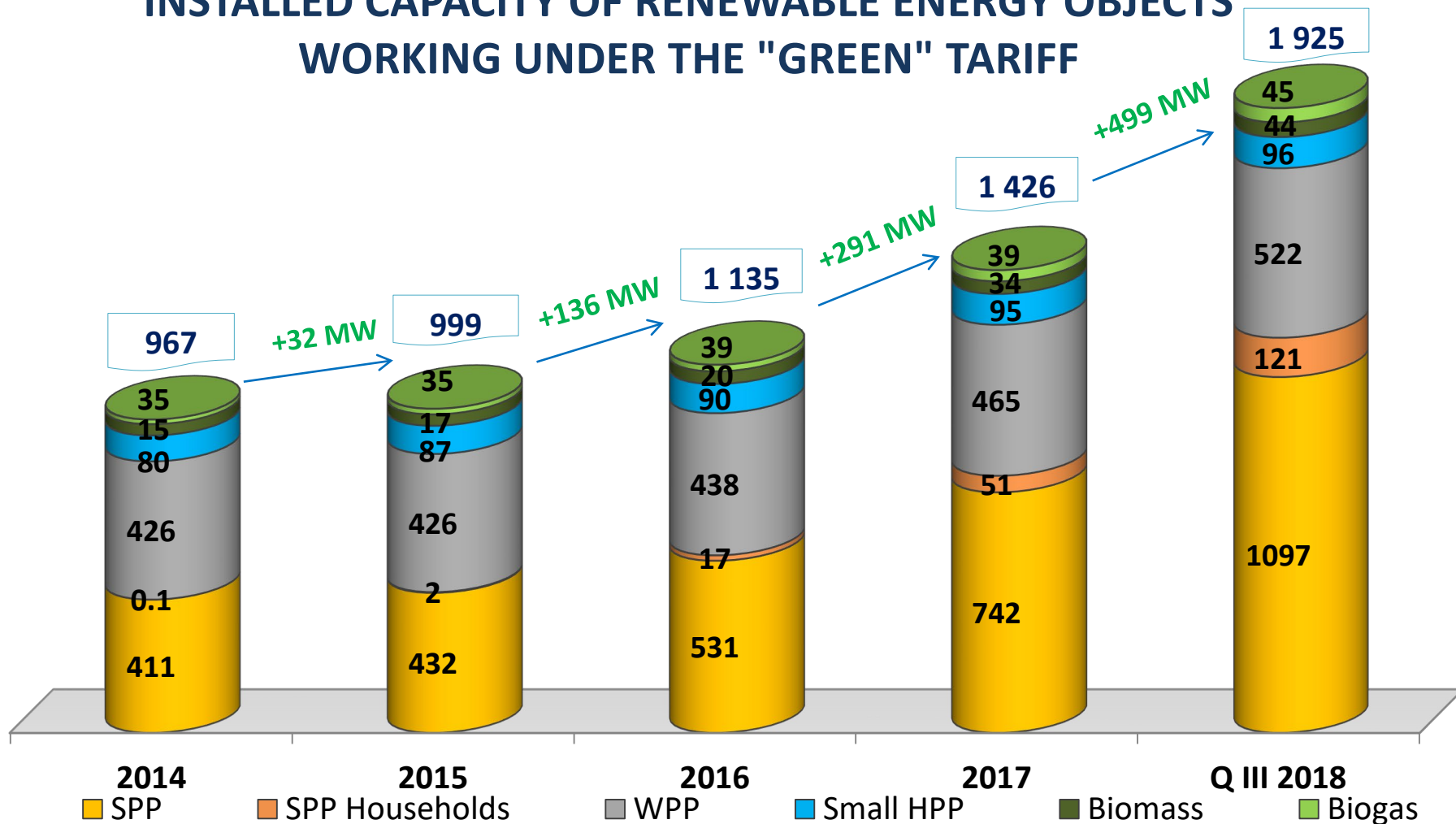
Technology/Comm.Year	2015	2016	2017-2019	2020-2024	2025-2029
Biomass	123.86	123.86	123.86	111.48	99.09
Biogas	123.86	123.86	123.86	111.48	99.09
Geothermal	150.25	150.25	150.25	135.17	120.09
Small Hydro (0.2-1MW)	139.48	139.48	139.48	125.48	111.48
Small Hydro (1-10MW)	104.47	104.47	104.47	94.24	83.47
Solar (ground based)	169.64	159.94	150.25	135.17	120.09
Solar (roof based)	180.41	172.33	163.71	147.56	130.86
Wind (>2MW)	101.78	101.78	101.78	90.47	79.16
Solar (private households)	200.32	190.09	180.94	162.63	144.86
Wind (private households)	116.06	116.06	116.06	104.47	93.16

- Feed-in tariffs are fixed in EUR till 2030;
- Premium for Ukrainian equipment usage is provided – 5-10% to existing tariff;
- Signing of bankable long-term Power Purchase Agreement (PPA) with feed-in tariff till 2030;
- Stimulating tariffs for heat produced from alternative sources envisaged.





## INSTALLED CAPACITY OF RENEWABLE ENERGY OBJECTS WORKING UNDER THE "GREEN" TARIFF



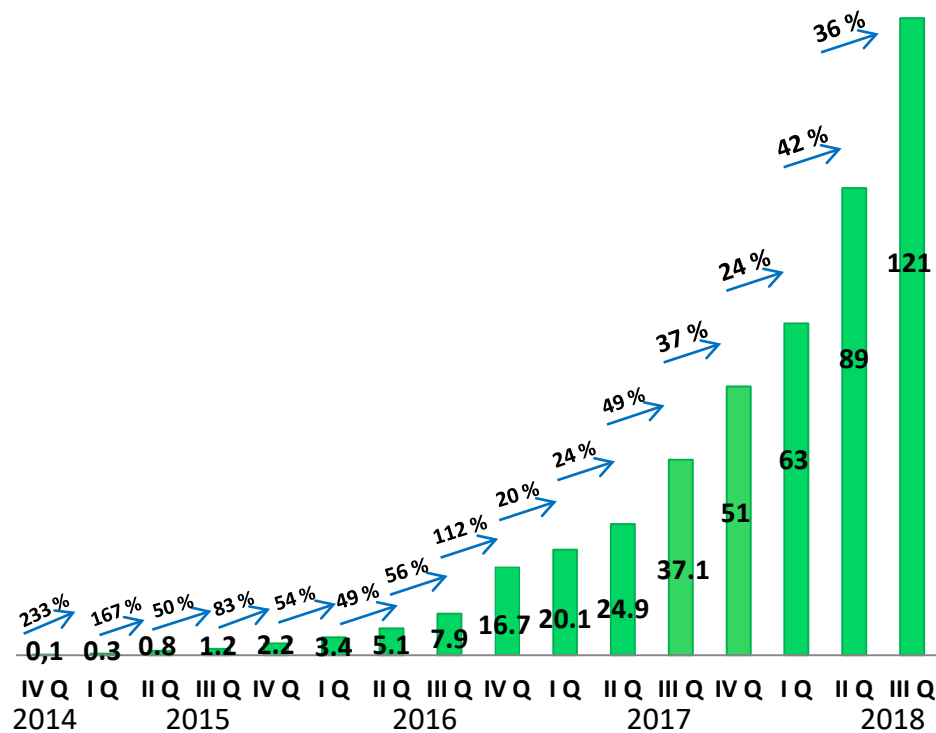
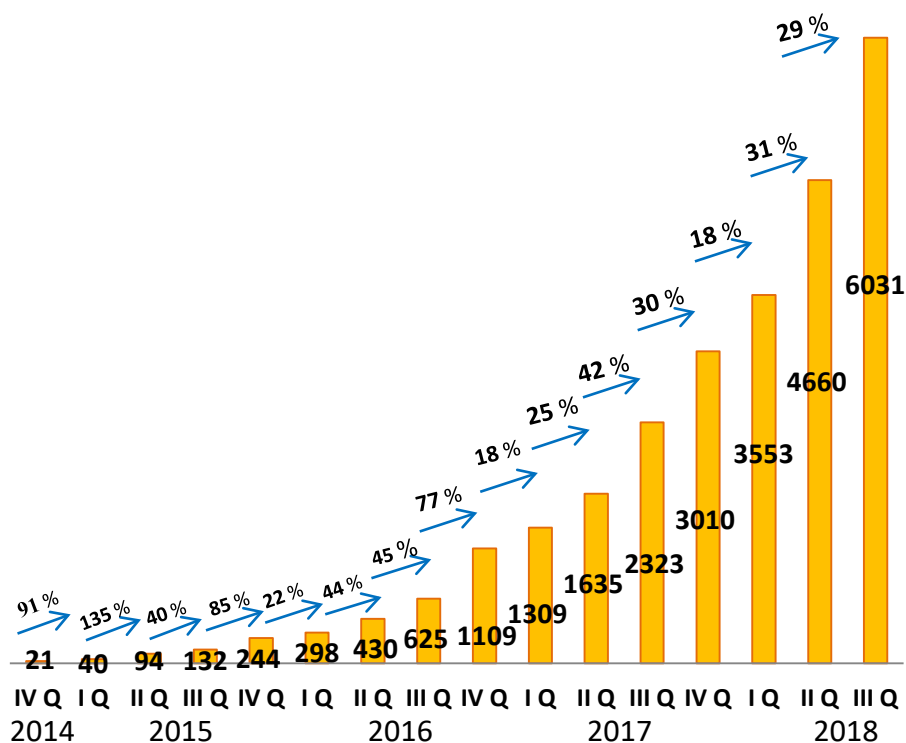
From the beginning of 2015, 958 MW were introduced and around € 910 mln were invested.



# DYNAMICS OF SOLAR INSTALLATIONS IN PRIVATE HOUSES

Number of privat households

Installed capacity, MW



Around **120 mln EURO** invested.

The number of private houses eligible for solar panels  
installation is 6,5 mln



# Current situation in Ukraine with generation of household solid waste (HSW)

Annually:

**300 – 350 kg**  
of household solid waste



is produced by one  
person in Ukraine

**10 mln tons**  
of household waste



removed to the landfills in Ukraine

gas equivalent  
 **$\approx 1 \text{ bln m}^3$**



**3,5 mln Gcal**  
of thermal energy



**1,2 billion kWh**  
of electric energy



8





# EXAMPLES OF SUCCESSFUL RENEWABLE

## Combined Heat & Power (CHP) on renewable fuels



**CHP provides heat and electricity:**

**190** residential buildings (**22 000** dwellers);  
**3** kindergartens; **5** schools.

Capacity: **45 MW** including:

**15 MW** – solid fuel boiler (5 and 10 MW);

**1,8 MW** – turbine with ORC module (on solid fuel);

**3 MW** – electric power.

Fuel: **wood chips, pellets**

Investments: **8,2 mln EUR**

## Bohivska wind power station



**Electricity output to the Integrated Power System of Ukraine – 634 mln. kWh**

Installed capacity: **200 MW**

Total investment: **€ 340 mln**

The level of "green" tariff:

**11,3 €ct/kWh**

## Wind power turbines production plant



**Under license of German company Fuhrlaender AG**

Capacity of turbines:

**2,5 MW, 3,2 MW**

Height: **100 m**



# EXAMPLES OF SUCCESSFUL RENEWABLE

## Teofipol biogas complex 15 MW



Town: **Teofipol, Khmelnytskii region**

Type of fuel: **sugar beet pulp, corn silage**

Electricity production: **15 MW**

- 5 MW (first line working on sugar beet pulp);
- 10 MW (second line working on corn silage).

Heat production: **15 MW**

Investments: **40 mln EUR**

Equipment: **Jenbacher (Austria)**

## Plant for landfill gas degassing



City: **Khmelnytskii**

Start of operation **2017**

Capacity: **659 kW**

Electricity production:

**5,13 kWh/year**

Investments: **34 mln UAH**

**(1,1 mln EUR)**

Investor: **Biogas Energy (Ukraine)**

## Energy willow (SALIX energy)



Company: **«SALIX energy»**

Plantations area: **1 700 ha**

Crop capacity: **20 t/ha**

Annual growth: **34 000 t/year**

Crop capacity cycle: **25 years**

Heat of combustion:

**17,3-18,0 MJ/kg**



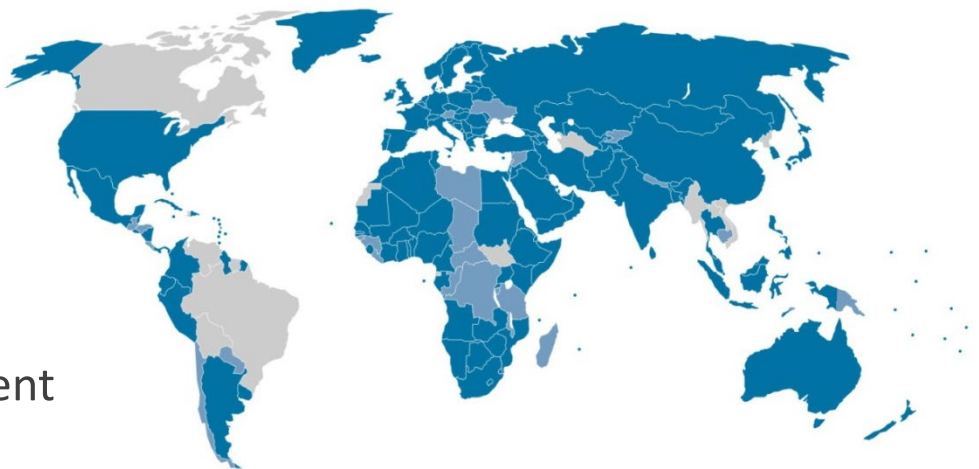
# Law of Ukraine «On Ukraine's Accession to the Statute of the International Renewable Energy Agency (IRENA)»

On February 24, 2018 Ukraine officially became IRENA's member!



## Ukraine's membership at IRENA:

- ✓ renewable projects financing by the Abu Dhabi Fund for Development (ADFD) under 1-2% for up to 20 years;
- ✓ legislation improvement;
- ✓ “green” investment attraction;
- ✓ additional guarantees to investors;
- ✓ cooperation with development countries in renewable energy;
- ✓ access to the IRENA's database.



- **159** IRENA's members
- **24** countries started the accession procedure



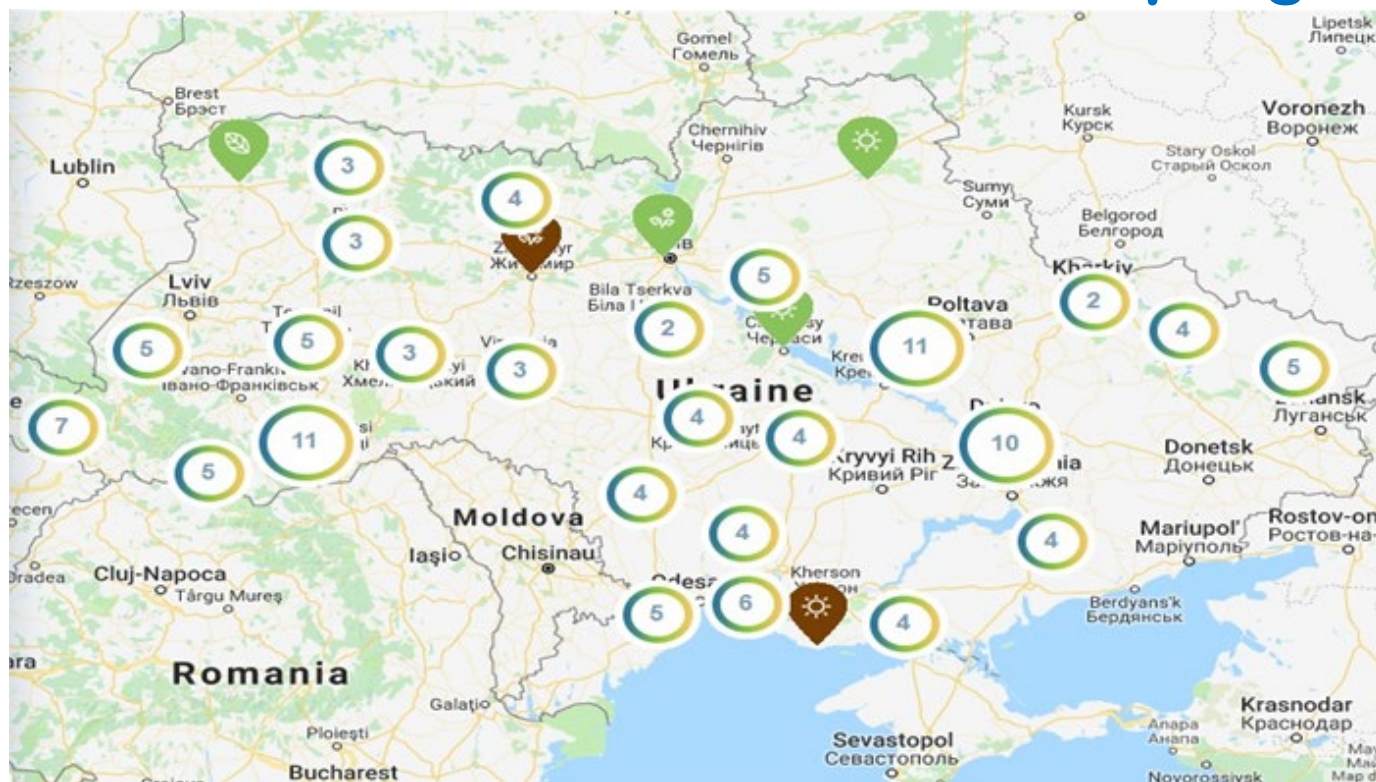


**UAMAP** comprises detailed information on more than 79 implemented  
and 101 potential projects that require investments & soft loans in amount of

**€ 4 bln**

[www.uamap.org.ua](http://www.uamap.org.ua)

	Hydropower	✓
	Biomass	✓
	Biogas	✓
	Solar power	✓
	Wind power	✓
	Energy efficiency	✓
	Waste energy	✓
	Other	✓



All-Ukrainian  
Sustainable  
Development &  
Investments  
Agency



Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH



Danish Energy  
Agency

On behalf of:

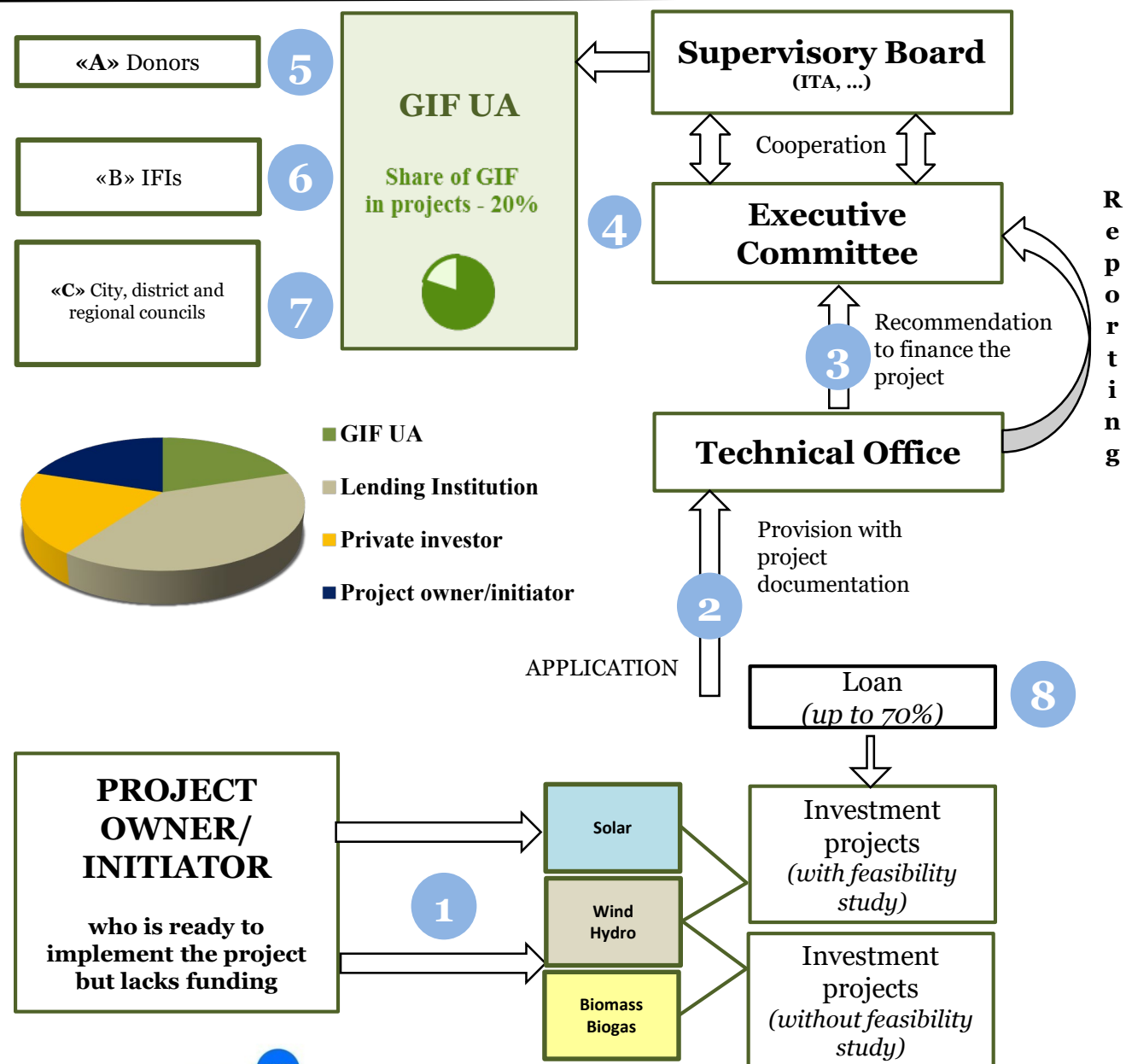


Federal Ministry  
for the Environment, Nature Conservation,  
Building and Nuclear Safety

of the Federal Republic of Germany



# GIF UA: SCHEME OF OPERATION IN BRIEF

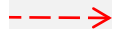


- 1** Customer appeals to GIF and selects interesting project(s) or offers his own.
- 2** Application Form is processed by Technical Office of GIF
- 3** Decision on the type of financing and interaction model with a project
- 4** GIF assesses and offers its equity share in RES project
- 5-6-7** Stakeholders invest in GIF UA
- 8** Banks give loans to the new projects



# ROADMAP ON THE IMPLEMENTATION OF GREEN BONDS MARKET IN UKRAINE

Action Plan for  
Implementation  
of the "Energy Sector  
Reform 2020" of the Energy  
Strategy of Ukraine  
till 2035



Creation of conditions for  
implementation of green bonds  
market in Ukraine as an  
instrument to attract investment  
in renewable energy and energy  
efficiency projects



State Agency on Energy  
Efficiency and Energy Saving  
and other public authorities  
*2019 - 2020*

## Development of legislation



Introduction of the green  
bonds notion into Ukrainian  
legislation and establishment of  
legal regime of their issue in  
the context of issuers;

Development of guidelines,  
procedures and incentives for  
the green bonds market.

## Realization of pilot projects



Feasibility studies preparation for  
green projects and cost calculation  
in the context of issuers;

Conducting an independent  
valuation of issuers;

Estimation of bonds certification  
according to the international  
standards.

## Attracting green financing



Preparation and holding of a large-  
scale marketing session (RoadShow)  
on the internal and external capital  
markets;

Partners involvement for  
cooperation (International Financial  
Institutions, Green Climate Fund,  
Green Bond Fund for Developing  
Markets, Institutional Investors,  
etc.)



# INVEST in UKRAINE!

State Agency on Energy Efficiency and Energy Saving of Ukraine

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